

<sup>A</sup>  
TOMSHOV, N.D.; BYALOBZHESKIY, A.V.

Methods of measuring the porosity of anodic oxide films on aluminum  
and its alloys. Trudy Inst. Fiz. Khim., Akad. Nauk S.S.S.R. 3,  
Issledovaniya Korrozii Metal. No.2, 17-23 '51. (MLRA 5:2)  
(CA 47 no.17:8559 '53)

BATRAKOV, V.P.; KURTEPOV, M.M.; TOMASHOV, N.D.

Georgii Vladimirovich Akimov. Zhur. Fiz. Khim. 27, 313-16 '53. (MLRA 6:5)  
(CA 47 no.18:9071 '53)

TOMACHOV, N. D.

Electrometallurgy

Conditions for the formation of the passive state in a metal, Dokl. AN SSSR 88, No. 6, 1953.

Discusses phenomenon of passivity in metals, concluding that origination of passivity is connected with beginning of process of metal oxide anodic formation. Established that oxides may form on the anode not only as a result of secondary processes of interaction between products of anodic and cathodic reactions and electrolyte, but also from primary anodic electrochem oxidation. Submitted by Acad. S. I. Vol'fkovich  
9 Jan 53. 258T54

9. Monthly List of Russian Accessions, Library of Congress, May 1953. Unclassified.

TOMASHOV, N. D.

"Increasing the Stability of Metal Passivity," N.D.Tomashov and G.P.Chernova,  
Dok AN SSSR, Vol 89, No 1, pp 121-24, 1953.

Investigates electrochem and corrosion characteristics of 4 stainless steels alloyed with 0.1% Pt, 0.1% Pd, 0.93% Pd, and 1.24% Cu, respectively, concluding that these cathodic additions considerably increase passivation capability of stainless steels. The same effect was shown by very thin layers of Ag, Pt, and Pd deposited on the surface of ordinary stainless steel. Discusses the nature of passivity and increased resistance to corrosion of stainless steels in solutions of  $H_2SO_4$ . Presented by Acad S.I.Vol'fkovich  
9 Jan 53. 259T17

*Evaluation B-76, 505*

Chemical Abst.  
Vol. 48  
Apr. 10, 1954  
Electrochemistry

②<sup>3</sup>

Effect of cathodic evolution of hydrogen on the limiting diffusion current of oxygen depolarization. N. D. Tomashev and T. V. Matveeva. *Doklady Akad. Nauk S.S.S.R.* 90, 67-69 (1953); cf. *C.A.* 45, 8144d. — During a study of corrosion processes, the rate of cathodic absorption of dissolved O on electrolysis was observed. A buffered 0.5N soln. of NaCl (pH 8.2) was electrolyzed in a pure O atm. (25°, 760 mm.) with a smooth Pt cathode at c.d. values between 0.081 and 2.0 ma./sq. cm. The rates of H evolution (I) and O absorption (II), corresponding to the limiting diffusion current, varied from 0 to 0.91 and 0.019 to 0.03 cc./sq. cm. hr., resp. The value of II was max. when the c.d. was 1 ma./sq. cm. The effect of H evolution on the limiting diffusion current was due to the decrease in thickness of the diffusion layer that resulted from the presence of H bubbles.  
J. W. Loweberg, Jr.

70745-151 1.2

USSR/ Scientific Organization - Conference

Card 1/1 : Pub. 124 - 14/24

Authors : Tomashev, N. D., Dr. of Chem. Sc.; and Shchigolev, P. V., Cand. of Chem. Sc.

Title : Scientific conference on corrosion and protection of metals

Periodical : Vest. AN SSSR 9, 73-76, Sep 1954

Abstract : Minutes of scientific conference held at the Institute of Physical Chemistry of the Academy of Sciences USSR at which the problems of corrosion and means of protecting metals against effects of corrosion, were discussed.

Institution : Academy of Sciences, USSR, Institute of Physical Chemistry

Submitted : ...

~~TOMASHOV, V.D.~~ professor, doktor; TITOV, V.A., kandidat tekhnicheskikh nauk.

Corrosion fatigue of metal. Sbor.Inst.stali no.32:331-345 '54.  
(MLRA 10:5)

1.Kafedra korrozii.

(Steel--Corrosion)

Tomashov, N. D.

USSR/ Chemistry - Physical chemistry

Card 1/1 Pub. 22 - 29/48

Authors : Tomashov, N. D., and Chernova, G. P.

Title : Phenomenon of disturbance of the passive state of stainless steel in strong oxidizing media

Periodical : Dok. AN SSSR 98/3, 435-438, Sep 21, 1954

Abstract : The substance of the phenomenon of repassivation of stainless steel in a nitric acid solution containing potassium bichromate, is explained. The resistance of stainless steel, which is determined by the formation of phases or more accurately by the formation of adsorption oxide layers of the trivalent Cr contained in the steel, is discussed. The protective effect of a hexavalent Cr adsorption layer, forming on the surface of stainless steel, was analyzed. The effect of potassium bichromate in the nitric acid solution, on the rate of solution of stainless steel, was investigated and the results are listed. Ten references: 7-USSR; 1-USA; 1-German and 1-French (1931-1953). Graphs.

Institution : Academy of Sciences USSR, Institute of Physical Chemistry

Presented by: Academician A. N. Frumkin, May 19, 1954



TOMASHOV, N. D. (Prof., Dr. Chem. Sci.); MIROLYUBOV, E. N. (Engr.); ZHUK, M. D.;

"An Investigation of the Inactivity of Iron in Oxidizer Solution,"  
in book The Application of Radioisotopes in Metallurgy, Symposium XXXIV; Moscow;  
State Publishing House for Literature on Ferrous and Nonferrous Metallurgy, 1955.

Prof. N. D. Tomashov, Dr. Chem. Sci.; E. N. Mirolubov, Engr.; N. D. Zhuk, Ass't.,  
Chair of Metal Corrosion, Moscow Inst. of Steel im I. V. Stalin.

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✓ Effect of various factors on the growth of the anodic oxide film on aluminum in sulfuric acid solutions. N. D. Tonna-shov and A. V. Byrlobzhetskii. Trudy Inst. Fiz. Khim., Akad. Nauk S.S.S.R., No. 5, Issledovan. Korroz. Metal. No. 4, 99-112 (1955).—The object of this work was the investigation of the effect of temp. and motion of the electrolyte and compn. of the anode on the growth of the oxide films of internally cooled Al samples. The samples were disks 54 mm. in diam., cut out of sheets of com. Al 1 mm. thick. The corroding media were 2N and 4N H<sub>2</sub>SO<sub>4</sub> solns. Expts. were made at temps. varying from 0 to 20° because beyond this temp. the mech. quality of the film became unsatisfactory. The thickness of the oxide film increases with temp., reaching a max. at 10° and drops off for higher temps. It decreases with the c.d. and the concn. of the electrolyte. Any addn. to pure Al decreases the quality of the film, which becomes porous. The addn. of Cu is particularly harmful, while Mg and Si (up to 10%) have much less effect. Continuous mixing of the electrolyte is essential to avoid local heating of electrolyte in the porosities, leading to partial soln. of the film produced. A table of phys. properties of films obtained under different conditions accompanies the article.

N. Goldowski

RW 221

**"APPROVED FOR RELEASE: 04/03/2001**

**CIA-RDP86-00513R001756210007-2**

**APPROVED FOR RELEASE: 04/03/2001**

**CIA-RDP86-00513R001756210007-2"**

✓ Investigation of electrochemical processes involved in corrosion of metals in electrolytes containing hydrogen sulfide. N. D. Tomashov and A. Z. Pedotova. Trudy Inst. Fiz. Khim. Akad. Nauk S.S.S.R. No. 5, Izdatel'stvo Korrozii Metal. No. 4, 125-130 (1955). The study consisted in drawing polarization curves from data obtained in 0.5N NaCl solns. mixed with varying proportions of HCl to provide pH of 1 and 4. The electrodes were Pt and spectroscopically pure Fe. The atm. was varied from pure O to pure H<sub>2</sub>S. It was shown that when the reaction proceeded with H depolarization at the cathode, H<sub>2</sub>S decreased the overpotential of H evolution and facilitated the reaction at the anode, thus leading to acceleration of the corrosion rate. When the reaction proceeded with O depolarization, H<sub>2</sub>S still stimulated the anode reaction but the ionization of O taking place at the cathode was hindered. This effect was already noticeable when the concn. of H<sub>2</sub>S in the soln. was  $5 \times 10^{-3} \%$ . In this case the total effect of H<sub>2</sub>S on the process of corrosion depended on its relative effects at the anode and the cathode. N. Goldowski

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PM

✓ Investigation of the corrosion of metals in electrolytes containing hydrogen sulfide. N. D. Tomashov and A. Z. Fedotova. *Trudy Inst. Fiz. Khim. Akad. Nauk S.S.S.R.* No. 5, Issledovan. Korrosii Metal. No. 4, 140-62 (1955).  
*Chem* Eighteen different metals (cast iron and steel of different compns., Al and its alloys, Cu, and Zn) were immersed for 185 days in a 0.5N NaCl soln. maintained under an atm. contg. 2% H<sub>2</sub>S. The attack was measured by the loss of wt. The presence of H<sub>2</sub>S in the atm. increased about 1.5 times the corrosion rate of all Fe alloys except Si-cast iron whose attack decreased to 70% of its former value. Al and its alloys, Cu, and Zn were attacked less (almost to 22% of the former value). The results concerning the variation of corrosion rate of the different Fe alloys in synthetic sea water as a function of partial pressure of H<sub>2</sub>S (from 0.1 to 100%) showed that the corrosion rate for any given concn. was detd. by the relative magnitude of the O and H depolarization. In an atm. of 2% H<sub>2</sub>S, O depolarization was slowed down while H depolarization was improved in such proportion that the corrosion rate passed through a max. for this concn. For 100% H<sub>2</sub>S, the corrosion, which proceeded with H depolarization alone, was lower than under an atm. of pure air.  
 N. Goldowski

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PM

Tomashov, N.D.

Investigation of electrochemical corrosion of magnesium.

N. D. Tomashov, V. S. Komissarova, and M. A. Timonova.  
Izv. Akad. Nauk S.S.S.R. No. 5, 1955.

*Chen* *3* *5*  
Samples of pure (99.90%) and com. (99.73%) Mg and 2 alloys (9% Al and 6.4% Al + 2.7% Zn) were submitted to a 0.5% NaCl soln. buffered by the corrosion products to pH 10.2. The type of attack was studied by macrophotographs. The corrosion rate was measured by the vol. of H evolved during the attack, either with or without application of an external current. In both cases the corrosion rate was a linear function of time (except for the initial inhibition period). The corrosion rate was generally proportional to the total active anodic surface. It increased with the anodic c.d. because the no. of corrosion centers, const. for a given c.d., increased with the c.d. For high c.d.s. it was proportional to the logarithm of the c.d. The active microcathode surfaces of anodically corroding Mg were represented by the microsurfaces of the metal covered with a thin passive film. The cathodes appearing on the surface of the alloys (Cu for example) rapidly lost their effectiveness because they became veiled with a hydrate of Mg oxide. *N. Goldowski* *PM*

TOMASHOV, N.D.; BYALOBZHESKIY, A.V.

Various factors affecting the growth of an anodic oxide film on  
aluminum in a solution of sulfuric acid. Trudy Inst.fiz.khim. no.5:  
99-113 '55. (MLRA 9:5)

(Aluminum--Corrosion)

TOMASHOV, N.D.; MATVEYEVA, T.V.

Effect of a cathodic hydrogen on the diffusion flow limit of oxygen  
depolarization. Trudy Inst.fiz.khim. no.5:153-158 '55. (MLRA 9:5)  
(Electrolytic corrosion)

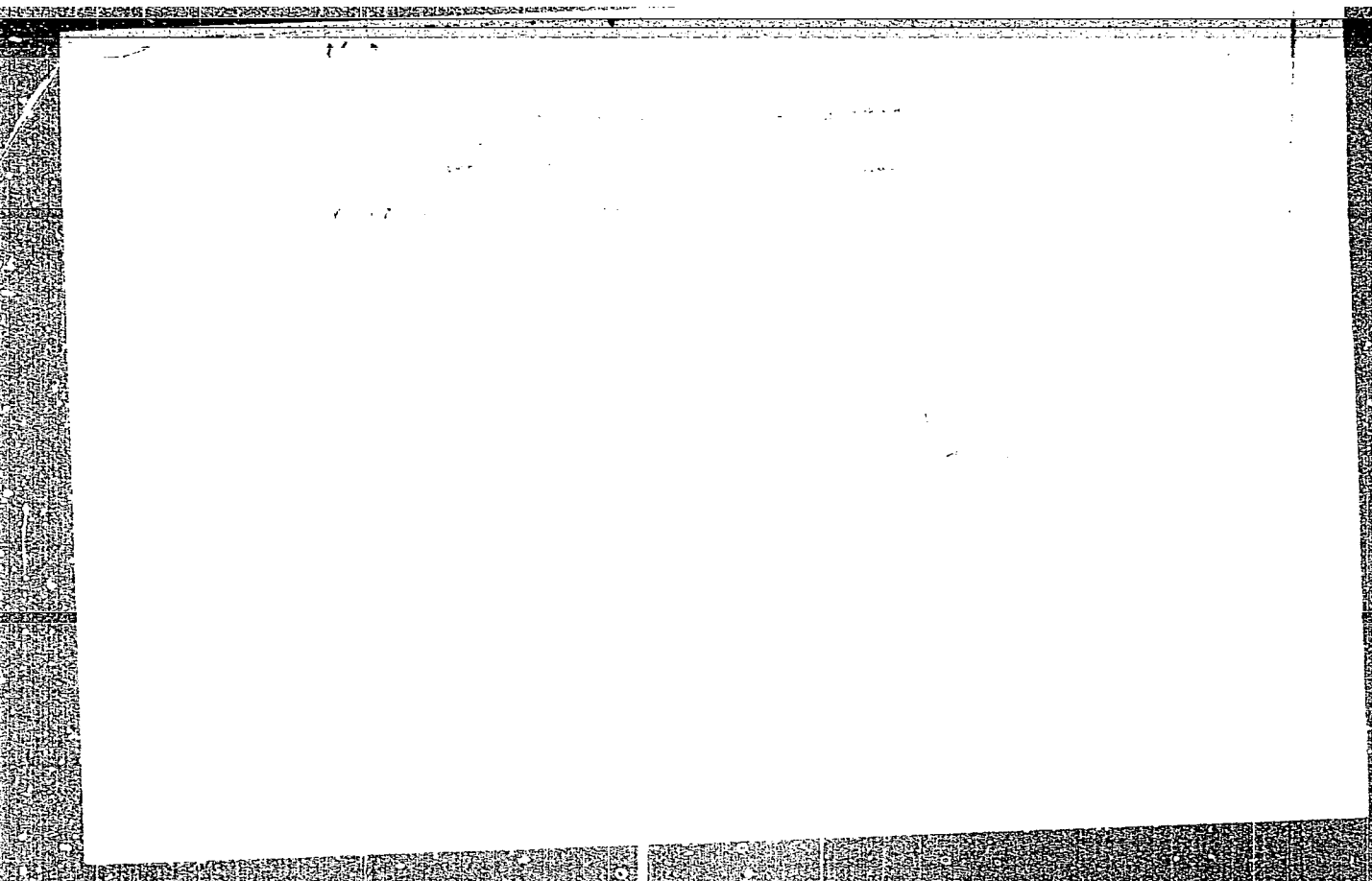


TOMASHOV, N.D.; CHERNOVA, G.P.; ANASHKIN, R.D.

~~XXXXXXXXXX~~  
Effect of cathodic constituents of structure on chromium-nickel  
steel corrosion in sulfuric acid solution. Trudy Inst. fiz.khim.  
no.5:159-171 '55. (MLRA 9:5)  
(Chromium-nickel steel--Corrosion) (Sulfuric acid)

**"APPROVED FOR RELEASE: 04/03/2001**

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**APPROVED FOR RELEASE: 04/03/2001**

**CIA-RDP86-00513R001756210007-2"**

ТОМАСОВ, Н. Д.

✓3080\* Installation for Studying the Anti-Corrosion Potential of Metal in Soil. Ustanovka dlia issledovaniia zashchitnogo potentsiala metallia v pochve. (Russian.) N. D. Tomashov and Iu. N. Mikhailovskii. Zavodskaya laboratoriya, v. 21, no. 11, 1955, p. 1380-1382.

Wk: Circuit of installation for stabilization of electrode potential in soil during cathodic polarization. Change in cathodic current density with time during polarization of cast-iron electrode in soil. Effect of moisture of soil on corrosion rate. Circuit diagram, graph, table.

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1000

PC 1000

T. ASHON, N.D.

2

✓ Electrochemical theory of corrosion and the ways of rel-  
ing the corrosion resistance of metallic alloys. N. D. Toma MG  
shov. Uspekhi Khim. 24, 453-70 (1955). — A review of the  
theory of corrosion from the view of electrochemistry. The  
improvement of corrosion resistance is considered from 3  
aspects: reduction of anodic activity of the alloy, the  
formation of protective films on the alloy, and formation of  
protective films on the surface of the alloy. The review is  
accompanied by 10 references. 1 of 1000000

of

MIROUXUBOV, Ye.N., inzhener; ZHUK, N.P., dotsent, kandidat khimicheskikh nauk;  
TOMASHOV, N.D., professor, doktor khimicheskikh nauk.

Investigating the passivity of iron in oxidizing solutions. Sber.Inst.  
stali 34:320-329 '55. (MLRA 9:7)

1.Kafedra kerrozii metallov.  
(Iron alloys) (Radioactive isotopes--Industrial applications)

*TOMASHOV, N. D.*  
USSR/Engineering - Surface treatment

Card 1/2                      Pub. 22 - 34/52

Authors                      :      Shchigolev, P. V., and Tomashov, N. D.

Title                        :      Metal electro-polishing method

Periodical                  :      Dok. AN SSSR 100/2, 327-330, Jan 11, 1955

Abstract                    :      The process of anodic solution of Ni, Cu, stainless steel, Zn and Al was investigated in electrolytes which are being recommended for the polishing of the very same metals. It was observed that the electro-polishing process is immediately followed by an intensive anodic polarization which lead to the derivation of potential values at which the reaction of the anodic oxidation of the metal and the anion discharge plus the formation of gaseous oxygen become possible.

Institution                :      Academy of Sciences USSR, Institute of Physical Chemistry

Presented by               :      Academician P. A. Rebinder, July 23, 1954

Periodical : Dok. AN SSSR 100/2, 327-330, Jan 11, 1955

Card 2/2 Pub. 22 - 34/52

Abstract : The effect of passivation of surface roughnesses during electro-polishing on the quality of the treated metal is emphasized. Fourteen references: 6 USSR, 5 USA, 2 French and 2 German (1935-1953). Graphs; drawing.

TOMASHOV, N. D.

✓ 793  
12 PROTECTION OF STAINLESS STEELS FROM CORROSION  
BY ANODIC POLARIZATION. N. D. Tomashov and G. P.  
Chernova. (Inst. of Physical Chemistry.). Doklady Akad.  
Nauk S.S.S.R. 104, 104-7 (1955) Sept. 1. (In Russian)  
Experiments with anodic polarization and weak current  
(from outside sources) applied as protection against  
corrosion of stainless steel in sulfuric acid gave positive  
results. (R.V.J.)

(1)



BOBYLEV, Aleksey Vasil'yevich; ~~TOMASHOV~~, N.D., professor. doktor, retsenzent;  
TURKOVSKAYA, A.V., kandidat tekhnicheskikh nauk; ~~SHERSIDER~~, A.V., redak-  
tor; ARKHANGEL'SKAYA, M.S., redaktor; MIKHAYLOVA, V.V., tekhnicheskii  
redaktor.

[Disintegration of brass caused by corrosion] Korroziionnoe rastreski-  
vanie latuni. Moskva. Gos.nauchno-tekhn. izd-vo lit-ry po cherno i  
tsvetnoi metallurgii, 1956. 120 p. (MLRA 9:5)  
(Brass--Corrosion)

PALEOLOG, Ye.N., kandidat khimicheskikh nauk, redaktor; ROZENFEL'D, I.L., doktor khimicheskikh nauk, redaktor; TYUKINA, M.N., kandidat khimicheskikh nauk, redaktor; TOMASHOV, N.D., professor doktor khimicheskikh nauk, redaktor; SHCHIGOLEV, P.V., kandidat khimicheskikh nauk, redaktor; BABICH, L.V., redaktor izdatel'stva; MAKUNI, Ye.V., tekhredaktor

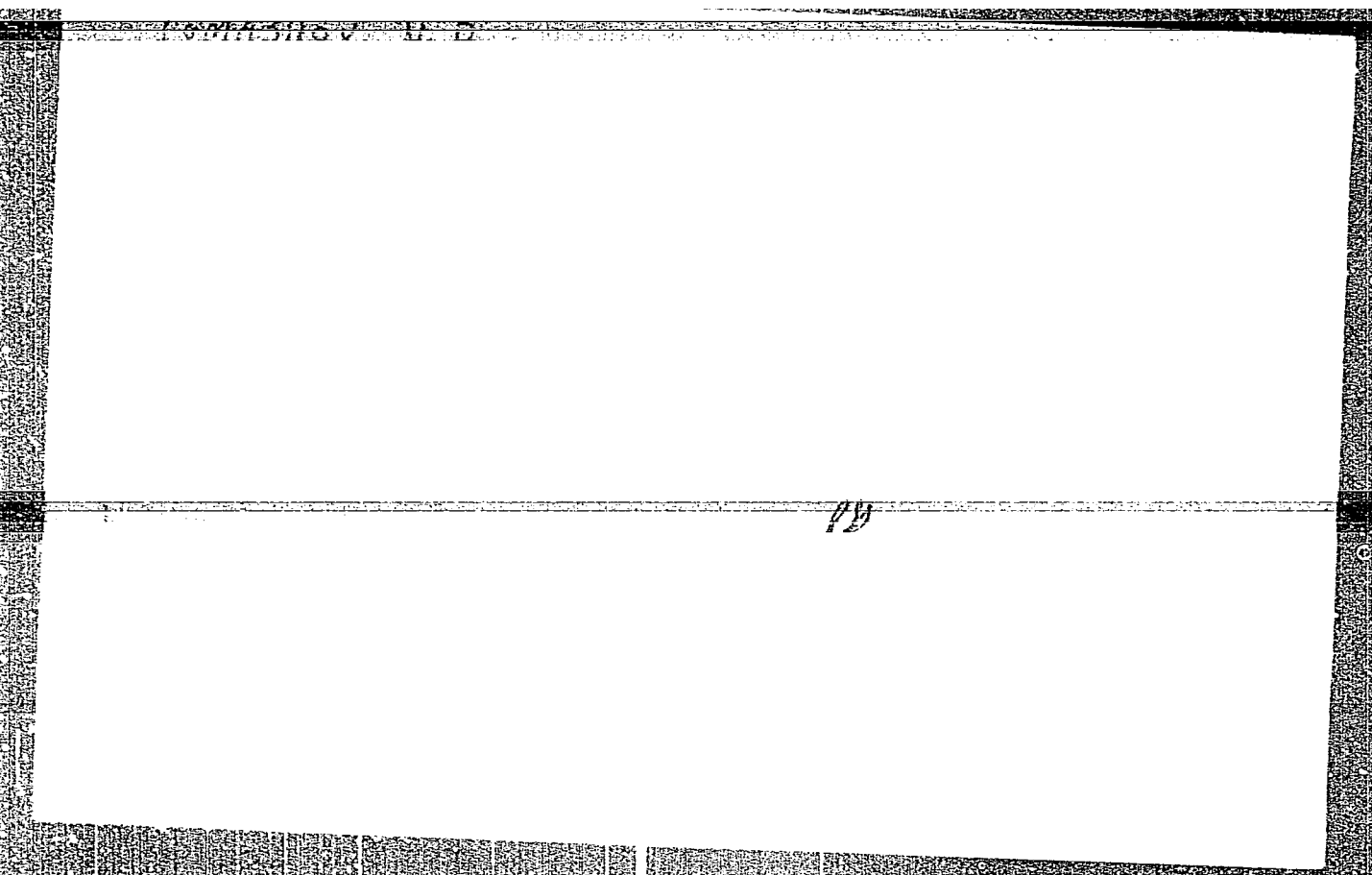
[Problems of corrosion and the protection of metals; proceedings of the conference] Problemy korrozii i zashchity metallov; trudy soveshchaniia. Moskva, Izd-vo Akademii nauk SSSR, 1956. 270 p. (MLRA 9:8)

1. Vsesoyuznoye soveshchaniye po korrozii i zashchite metallov. 5th, Moscow, 1954.

(Corrosion and anticorrosives)

"APPROVED FOR RELEASE: 04/03/2001

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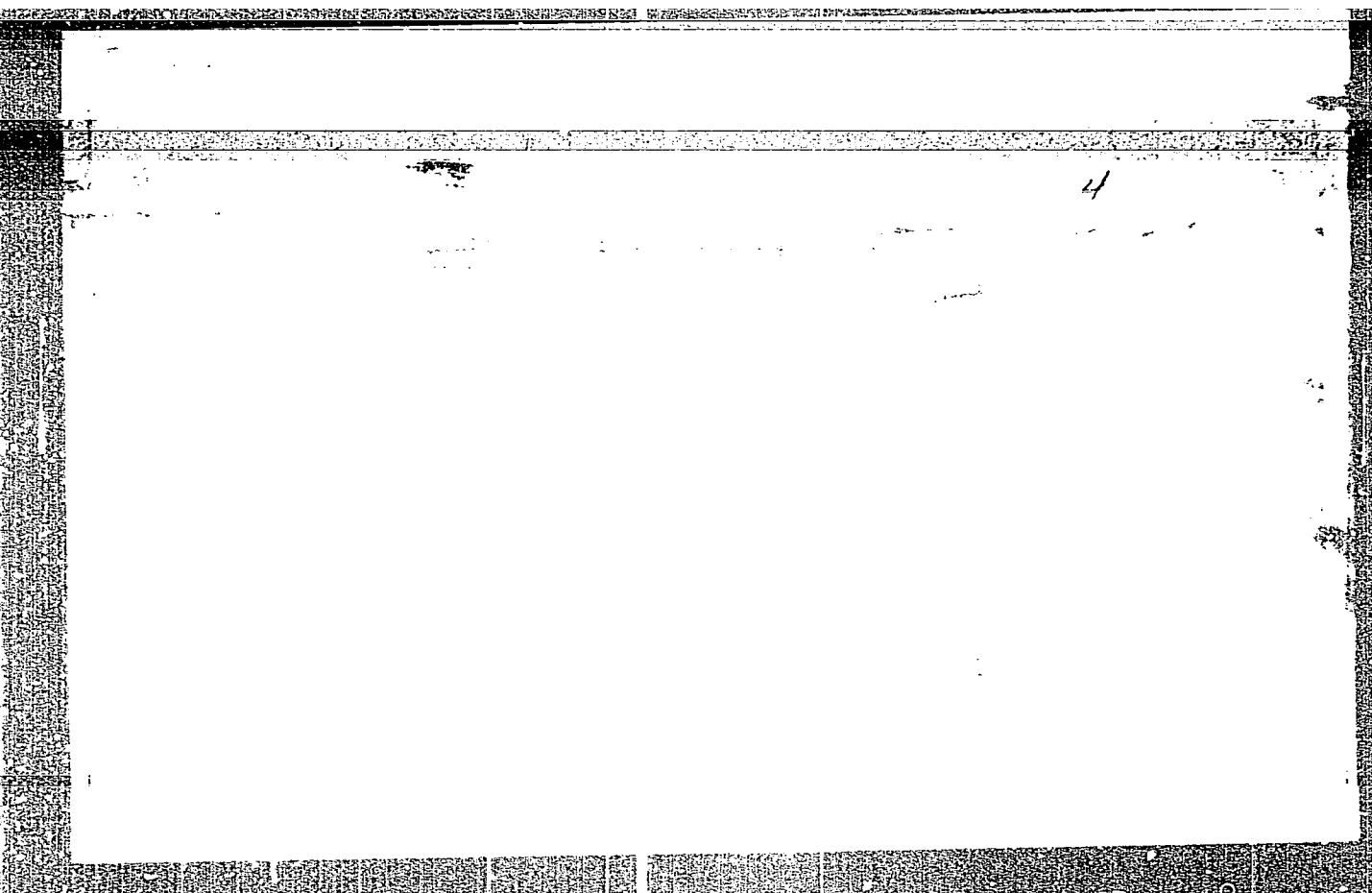
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**CIA-RDP86-00513R001756210007-2"**

USSR/Corrosion - Protection From Corrosion,

J.

Abs Jour : Referat Zhur - Khimiya, No 4, 1957, 14087

Author : Tonashov N.D., Shchigolev P.V.

Inst : Academy of Sciences USSR

Title : Problems of Underground Corrosion (All-Union  
Conference in Moscow)

Orig Pub : Vestn. AN SSSR, 1956, No 8, 108-110

Abstract : No abstract.

Card 1/1

- 1 -

TOMASHOV, N. D.

USSR/Corrosion - Protection from Corrosion, J

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 63862

Author: Tomashov, N. D., Berukshtis, G. K., Lokotilov, A. A.

Institution: None

Title: Instrument for Determination of Corrosive Properties of the Atmosphere

Original

Periodical: Zavod. laboratoriya, 1956, 22, No 3, 345-349

Abstract: The design of the instrument is based on the principle of providing a corrosion couple, in which during one measurement are retained the microcouples, and microscopes transmitting operating conditions of microcouples, and in another the macrodimensions. The instrument consists of 15-20 Cu-electrodes (cathodes) and an equal number of Fe-electrodes (anodes). Thickness of the plates  $< 0.5$  mm. The electrodes are assembled in a bundle, being separated by insulation layers 10-50  $\mu$  in thickness. Cathode plates are connected in parallel to a single over-all lead, the anodes to another. The leads are connected to a sensitive microammeter or an automatic recording device. Working surface of the

Card 1/2



USSR/Corrosion - Protection from Corrosion, J

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 63862

Abstract: model are the carefully ground end surfaces of the plates, the sides and opposite end-surfaces of the plates being insulated. When a film of moisture is formed on the working surface of the instrument a difference in potential arises between cathode and anode plates, and a current begins to flow. The instrument registers currents arising not only on a visible moisture deposit formation at the surface of the electrodes but also those resulting from the formation of a moisture film due to an adsorption of water vapor. Corrosive properties of the atmosphere and their changes with time can be characterized on the basis of the corrosion current magnitude, which is registered periodically by the galvanometer or is constantly recorded by the automatic recording device.

Card 2/2

TO MACHIN N.D

REPORTEDLY, THE ...

TOMASHOV, N.D., doktor khimicheskikh nauk; SHCHIGOLEV, P.V., kandidat khimicheskikh nauk.

Corrosion and protection of metals; all-Union coordinated meeting. Vest.  
AN SSSR 26 no.3:135 Mr '56. (MLRA 9:6)  
(Corrosion and anticorrosives)

TOMASHOV, N.D., doktor khimicheskikh nauk; SECHIGOLEV, P.V., kandidat khimicheskikh nauk.

Problems of underground corrosion; all-Union conference in Moscow.  
Vest.AN SSSR 26 no.8:108-110 Ag '56. (MLBA 9:9)  
(Corrosion and anticorrosives)

10/11-11/11, 11/11.  
NABOKOV, V.S.; PALEOLOG, Ye.N.; TOMASHOV, N.D.

Adsorption method for determining the porosity of protective films  
on metals. Zhur. fiz. khim. 30 no.12:2705-2712 D'56.

(MLRA 10:4)

1. Akademiya nauk SSSR, Institut fizicheskoy khimii, Moskva.  
(Adsorption) (Films (Chemistry))

76 MKSHOV, N.D.

TOMASHOV, N.D.

USSR/Corrosion - Protection From Corrosion

J.

Abs Jour : Referat Zhur - Khimiya, No 4, 1957, 14090

Author : Tomashov N.D., Mikhaylovskiy Yu.N.

Inst : Academy of Sciences USSR

Title : Mechanism of Electrochemical Corrosion of Metals on the Soil

Orig Pub : Dokl. AN SSSR, 1956, 108, No 4, 668-671

Abstract : In expanding the concepts of an electrochemical mechanism of corrosion in the soil there are pointed out the following characteristic types of macrocorrosion couples, the existence of which often determines the most pronounced destruction of metallic underground structures. 1. Macrocouples, due to different permeability to oxygen, of soil of different nature (clay, sand). 2. Macrocouples associated with local heterogeneity of soil. 3. Macrocouples formed as a result of boundary effect of the diffusion of  $O_2$  in the soil at the edges of the

Card 1/2

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Corrosion - Protection from corrosion

J.

Abs Jour : Referat Zhur - Khimiya, No 4, 1957, 14090

structure. Discussed are the results of experiments with models which confirm the mechanism of the formation of corrosion couples of type 1, 2 and 3. Emphasized is the predominant role of macrocouples in cases of corrosion in the soil that lead to deep fissuring damage at areas of inhibited  $O_2$  access.

Card 2/2

- 3 -



TOMASHOV, N.D.; MIKHAYLOVSKIY, Yu.N.

An investigation of the kinetics of electrode processes under  
liquid adsorption films. Dokl. AN SSSR 110 no.6:1026-1029 0 '56.  
(MLRA 10:2)

1. Institut fizicheskoy khimii Akademii nauk SSSR. Predstavleno  
akademikom A.N. Frumkinym.  
(Electrodes) (Adsorption)

SOV/81-59-10-35561

Translation from: Referativnyy zhurnal. Khimiya, 1959, Nr 10, p 305 (USSR)

AUTHORS: Nabokov, V.S., Paleolog, Ye.N., Tomashov, N.D.

TITLE: A New Method for Determining the Porosity and the Structure of Oxide Films<sup>18</sup> on Metals

PERIODICAL: Tr. In-ta fiz. khimii. AS USSR, 1957, Nr 6, pp 39-49

ABSTRACT: An adsorption method has been developed for determining the structure of protective films on metals. The method is used for determining the porosity of protective films on Al obtained by anodic oxidation. It has been shown that with an increase in the time of anodic oxidation (from 5 to 120 min) the real surface of the film increases, in which case the diameter of the pores, the total volume of the pores and consequently the percentage of the porosity of the film increases. The number of pores in the process of anodic oxidation does not change. The method is applicable to the study of the mechanism of the growth of protective films on metals.

M.S.

Card 1/1

SOV/137-58-8-17369

Translation from: Referativnyy zhurnal, Metallurgiya. 1958, Nr 8, p 168 (USSR)

AUTHORS: Tomashov, N.D., Berukshtis, G.K.

TITLE: A Method for the Determination of the Corrosive Activity of the Atmosphere (Metod opredeleniya korrozionnoy aktivnosti atmosfery)

PERIODICAL: Tr. In-ta fiz. khimii. AN SSSR, 1957, Nr 6, pp 50-55

ABSTRACT: The device is assembled of 30 Cu and 30 Fe plates, separated from each other by cigarette paper impregnated with bakelite varnish. Upon the formation on the device of a film of moisture it produces in the outer circuit a current registered by a recording microamperemeter. The instrument permits the registration of the total corrosion current circulating on the surface of the device upon the formation of adsorption films and likewise upon the formation of visible films of water. Experiments performed for the explanation of the effect of the products of corrosion on the work of the device showed that the maximum corrosion current and the amount of corrosion undergo sharp variations only at the beginning. then, proportionally to the thickening of the film of the corrosion products, their

Card 1/2

SOV/137-58-8-17369

A Method for the Determination of the Corrosive Activity of the Atmosphere

protective properties do not vary any more, and the operation of the device stabilizes. The corrosion products forming also affect the kinetics of the electrode processes. With the aid of the device described the variation in the current upon the drying of the moisture films formed during rain or the condensation of dew was studied. It is demonstrated that the maximum current corresponds to the complete disappearance of the visible water film, while a sharp decrease in the current intensity occurs on drying of the corrosion products. The device can be used in open air and in storage buildings.  
K.Zh.

1. Atmosphere--Corrosive effects
2. Machines--Performance
3. Corrosion--Test methods

Card 2/2

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**CIA-RDP86-00513R001756210007-2"**

TOMASHOV, N.D.

MIKHAYLOVSKIY, Yu.N.; TOMASHOV, N.D.

Method for field investigation of corrosive properties of soils.  
Zav. lab. 23 no.4:450-454 '57. (10:6)

1. Institut fizicheskoy khimii Akademii nauk SSSR.  
(Soils---Analysis) (Electrolytic corrosion)

TOMASHOV, N.D.

32-6-11/54

AUTHOR  
TITLE

TOMASHOV, N.D., DERYAGINA, O.G.

The Determination of the Inclination to Corrode of Intermediary  
Crystals of Metal Constructions.

PERIODICAL

(Opredele niye sklonnosti svarnogo soyedine niya metallicheski kn kon-  
struktsiy k meznkristallitnoy korrozii -Russian)  
Zavodskaya Laboratoriya, 1957, Vol 23, Nr 6, pp 679-682 (U.S.S.R.)  
Reviewed 8/1957  
Received 7/1957

ABSTRACT

The investigation of the corrosion of intermediate crystals in the wel-  
ding seams of newly produced steel objects are not carried out because  
"suitable methods are lacking". Such corrosions are mostly found to exist  
only after the material has already been used for some time and after  
the process of destruction has already been developed. It is suggested  
in the paper that such welding seams as incline towards corrosion should  
be detected as soon as possible without cutting out. From publications in  
scientific periodicals it may be seen that one and the same type of steel  
will show different degrees of inclination towards corrosion according to  
different kinds of heat treatment, and herefrom it may be followed that  
there are welding seams at different points of the steel sample which are  
subjected to different kinds of thermal influence. A test method to be em-  
ployed in the case of steel objects made of stainless chromium nickel  
steel 1X18H9T is described. As a solution 5%  $\text{HNO}_3$  + 1%  $\text{FeCl}_3$  is taken.  
It is shown by 1 table and 4 drawings that displacement towards the ne-  
gative side of the potentials under the influence of the solution is par-  
ticularly intense at the points of inter-crystal corrosion. This method

Card 1/2

The Determination of the Inclination to Corrode of Inter- 32-6-11/54  
mediary Crystals of Metal Constructions.

is described as being of great practical use because the steel objects investigated are not damaged. On the basis of this principle is also possible to construct such apparatuses as permit control of the intercrystal corrosion properties of the steel seam without the loss of time.

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*TOMASHOV, N.D.*

AUTHOR  
TITLE

TOMASHOV, N.D., VEDENEYEVA, M.A., VASIL'YEVA, Z.I. 32-6-12/54  
The Electro-Chemical Method for the Determination of Anticorrosive Strength in Welding Joints of Alloyed Steels.  
(Elektrekhimicheskiy metod opredeleniya korroziionnoy stoykosti svaroynykh soyedineniy nizkolegirovannykh staley -Russian)  
Zavodskaya Laboratoriya, 1957, Vol 23, Nr 6, pp 683-686 (U.S.S.R.)  
Received 7/1957  
Reviewed 8/1957

PERIODICAL

ABSTRACT

For the determination of the anticorrosive strenght of deeply alloyed steels in welding joints as well as in those parts which are untouched by welding the application of the electrochemical method is recommended. This method is based upon the ratio of the electrochemical potentials in various zones of the welded steel object. The welding joint in contact with electrolyte forms a multi-electrode macrogalvanic element, the electrodes of which are: basic metal, welding seams, zones of thermal effect and zones of maximum voltage concentrations. Nonuniformity of the voltage distribution etc. caused by chemical as well as structural differences are formed on the metal surface of microgalvanic pairs, which served as research objects. Such experiments could prove to be dangerous if the anode of the welding seam becomes ground metal. In this case the tendency of the welding seam to corrode may be increased automatically, which, however, is due to the time taken by the experiment. An early determination of anticorrosive strenght

Card 1/2

32-6-12/54

The Electro-Chemical Method for the Determination of Anticorrosive Strength in Welding Joints of Alloyed Steels.

is described by the paper and the peculiarities are dealt with in detail.

(With 6 illustrations).

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Library of Congress.

*Tomashov, N.D.*

AUTHORS: Mikhaylovskiy, Yu.N., ~~Tomashov, N.D.~~

32-12-29/71

TITLE: The Method of the Electrochemical Investigation of Atmospheric Corrosion in the Case of a Relative Air Moisture of 100% and Less (Metod elektrokhimicheskogo issledovaniya atmosfery korrozii pri otnositel'noy vlazhnosti vozdukhа ot 100% i nizhe).

PERIODICAL: Zavodskaya Laboratoriya, 1957, Vol. 23, Nr 12, pp. 1462-1466 (USSR)

ABSTRACT: In the introduction it is said that the quantitative data on the kinetics of electrochemical processes taking place under a moisture-adsorption layer are still lacking in scientific publications. Therefore such a method is suggested. For this purpose 2 foil strips of the metals to be investigated (length 100 mm, thickness 50 μ), which serve as electrodes, were placed between three glass plates of equal size (and 1.5 mm thickness), and were pressed together in a plexiglass stand. The front surfaces formed by the ends of the glass- and metal strips were ground and formed the working surfaces on which the wires of the line were led to the metal plates. All this was placed into an exsiccator, and on the upper surfaces of the plexiglass stand two moist strips of filter paper were placed, to which two copper sulphate electrodes for comparison were added. In the interior of the exsiccator a certain moisture content of the air (saturated with acid

Card 1/3

The Method of the Electrochemical Investigation of  
Atmospheric Corrosion in the Case of a Relative Air  
Moisture of 100% and Less

32-12-29/71

solution) was created, viz. a) moisture 100%, b) moisture 75% with NaCl content, and c) moisture 50% with  $\text{Ca}(\text{NO}_3)_2$  content. The electric part of the exsiccator further consisted of a galvanometer, a battery of 150 V, a changeable resistance of 1.5-2.00 mg ohm, and one for 100.000 ohm; to this cathode a voltmeter was connected, the wiring circuit of which is described separately. Electric wiring makes it possible to maintain regulated polarization; the film of moisture forming on the front surfaces of the electrodes serves as electrolyte. In this connection it is pointed out that only the polished front surfaces of glass with metal had the property of adsorbing the layer of moisture, because such a layer does not form on plexiglass. Therefore, also the other surfaces (with the exception of the front surfaces) of the glass plates were coated with paraffin, so that the aforementioned adsorption on these surfaces became impossible. A number of experiments carried out in this connection is mentioned, the results of which are shown in form of drawings and in tables. There are 5 figures, 2 tables, and 7 Slavic references.

Card 2/3

The Method of the Electrochemical Investigation of  
Atmospheric Corrosion in the Case of a Relative Air  
Moisture of 100% and Less

32-12-29/71

ASSOCIATION: Institute for Physical Chemistry AN USSR (Institut fizicheskoy  
khimii Akademii nauk SSSR).

AVAILABLE: Library of Congress

Card 3/3      1. Atmospheric corrosion      2. Moisture-Air relativity  
                 3. Electrochemical-Determination

*TOMASHOV, N. D.*

AUTHOR: Tomashov, N. D. (Moscow)

TITLE: Theory of Subterranean Corrosion of Metals (Teoriia podzemnoy korrozii metallov)

PERIODICAL: Uspekhi Khimii, 1957, Vol. 26, No. 2, pp. 139-163 (U.S.S.R.)

ABSTRACT: Ways to protect pipelines, cables and similar underground metallic constructions from soil corrosion are presented. By 1960, the USSR will have 30,000,000 tons of pipeline laid underground; there will be 9,000 km. of gas pipelines and 15,000 km. of oil pipelines. The premature passing out of operation of only the main gas- and pipe-lines would cause great material loss. Transmission of electrical energy (DC) over great distances by means of underground cables stresses the question of their defense against corrosion.

A developed theory suitable for explaining the complex manifestations of soil corrosion does not yet exist, whereas for electrolytes, research in the Union and abroad has provided explanations and even forecasts of the behavior of a construction in cases of corrosion in electrolytes.

Card 1/10

### Theory of Subterranean Corrosion of Metals

The simplified concept of the electrochemical theory is not fully adequate for explaining the soil corrosion process.

Three qualities are stressed for soil as a corrosional electrolyte: 1. soil is a capillary-porous, often colloidal, system; 2. heterogeneity of soil structure and soil properties both in micro-scales (presence of microstructural components of soil particles, gas spaces, moisture) and in macro-scales (the inclusion of lumps, rocks, etc.), i. e., a periodic alternation of soils with varying properties; 3. the almost complete lack of mechanical intermixing and convection of the hard base of the soil.

The indicated soil qualities will influence the nature of the electrochemical corrosion process, greatly altering conditions of flow of the cathode and anode process in a transfer from liquid to soil corrosion. The author treats the anode and cathode processes with considerable detail. Under the latter process, he discusses the mechanism of oxygen depolarization of a cathode in soil and the mechanism of oxygen transfer into soil. (For further details, see explanation of text figures below).

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### Theory of Subterranean Corrosion of Metals

Turning to features of the work of corrosional cells in soil corrosion, the author stresses the types of cells that can function on the surface of an underground metallic structure: 1. extended macro-cells fixed by the varying oxygen penetrability of individual soil sectors; 2. macro-cells of local soil heterogeneity; 3. macro-cells at different depths of the structure; 4. marginal effect macro-cells; 5. micro-cells connected with structural microheterogeneity of the metal proper and 6. corrosional micro - macro-cells connected with discontinuity of oxide layers at the surface of iron and steel.

Soil corrosion is the result of combined action of the indicated macro- and micro-corrosional processes. The ohmic factor will not have substantial importance in micro-corrosional processes for soil corrosion and the intensity of the work of the micro-cells will be determined wholly by polarizing factors.

The author next takes up the role of micro- and macro-cells in an evaluation of corrosional activity of soils. The physico-chemical factors leading to the origin of micro-cells and facilitating the micro-cathods and anode processes have a basic effect on the advance of corrosion. For macro-corrosional processes, of basic importance are the factors fixing the course of the macro-cathode and anode processes and the ohmic resistance of the soil. Mathematical values

Card 3/10



### Theory of Subterranean Corrosion of Metals

and other data are presented for judging corrosional activity of soil for various metal structures: 1. small metal samples of slight extent; 2. gas tanks and other small compact structures; 3. main oil-, gas- or water pipelines, or extended soil hydrostructures, e. g., sheet pilings; this third group is most complex with respect to fixing the corrosional activity of the soils. In these cases, corrosion will proceed both owing to the functioning of micro-cells and macro-cells of types 2, 3, 4 mentioned above which are small in extent and, owing to the activity of very extended cells, having above all a varying oxygen penetrability.

The author next turns to the influence of organisms on corrosion of metals in soil. He defines the reactions occurring by electrochemical, chemical or biological means during anaerobic corrosion of iron under the influence of bacteria. The effect of life activity of soil bacteria on electrochemical corrosion processes is exerted by: 1. a direct or indirect effort on the anode or cathode electrochemical processes; 2. a change of the physico-chemical properties of the soils, leading to the creation of concentrated macro-corrosional cells upon the underground metallic structure; 3. negative effect of bacterial processes upon the durability of protective coatings on an organic base. However, the direct biological effect of bacteria upon metal either should not be hypothesized or is

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### Theory of Subterranean Corrosion of Metals

insignificant. The application of electrochemical protection (cathode polarization) fully prevents development of biological corrosion in soil.

Summing up, the author presents rules for combatting soil corrosion:

1. Corrosion from the work of macro-cells, chiefly as a result of the uneven aeration of separate sectors of the soil, has a more striking local character and is more dangerous than corrosion from the work of micro-cells, which is more general in nature.
2. Anodes of macro-cells, i. e. in sectors of extended structures being damaged mainly by local corrosion, will originate in sectors of the line having poorer oxygen penetrability.
3. The insulation covering on the pipeline in the soil should be in especially good condition at the anode sectors, since otherwise the corrosional process will concentrate at the weak points of the covering and the value of the corrosional penetrability may be greater than in the complete absence of a protective covering at the given sector.

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### Theory of Subterranean Corrosion of Metals

4. Along with the application of improved basic types of protection against underground corrosion (insulating coverings, electro-chemical protection, combatting stray currents), one must consider that an increase in homogeneity of the soil directly contiguous to the surface of steel structures will decrease the development of local corrosional cells. The presence of lumps of heavy soil (clays) upon a metallic surface situated in light arenaceous soil is particularly hazardous.
5. The insulation (sectionalizing) of separate sectors of extended construction in a transition of sectors of soil with abruptly varying oxygen penetrability will diminish the probability of the origin of extended macro-cells of dissimilar aeration and will hence decrease the intensity of local corrosion.
6. Corrosional tests conducted on individual samples cannot furnish a correct judgment of the intensity of corrosion of extended underground specimens passing through the same soil sectors. Charts of the corrosional attack of individual soils compiled on the basis of operation of old pipelines will not characterize properly analogous soils along other lines where the alternation of individual soils may proceed with a different sequence.

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Theory of Subterranean Corrosion of Metals

7. For extended underground structures, one may more properly speak of the corrosional activity of a sector of the line, rather than the corrosional activity of the soil. A determination of the corrosional activity of the soil (with respect to small objects) may be given on the basis of a determination of the polarizing characteristics (cathode and anode) under given conditions. A determination of the corrosional activity of a given sector of the line (with reference to extended structures) may be given on the basis of the establishment of the degree of variation of the oxygen penetrability (or variation in the value of cathode polarizability proportional to this penetrability) along the line, as well as a determination of the mean ohmic resistance of the given sector.

For a series of investigations conducted recently in the study of the basic laws of the diffusion of oxygen to a cathode and the mechanism of the process of oxygen depolarization in soil, the author cites the following personalities: Yu. N. Mikhaylovskiy

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### Theory of Subterranean Corrosion of Metals

and A. F. Lunev, M. N. Mikhaylov, A. N. Akulenok, A. F. Marchenko, and I. M. Yershov are cited for their studies in connection with corrosion evoked by stray currents.

Figure 1 presents an outline of the oxygen penetrability for various cases of corrosion (in solution, atmosphere, and soil). Figure 2 shows the dependence of the cathode potential upon time of polarization in sands of difference moisture contents. Figure 3 depicts relative oxygen concentration as a function of the distance (in cm.) from the boundary of soil-air. Figure 4 portrays the logarithm of the oxygen penetrability coefficient as a function of the moisture and argillaceous content of sand. Figure 5 illustrates the variation in density of marginal diffusional oxygen flow in dependence on the soil moisture content. The dependence of density of oxygen flow upon thickness of a moist sand layer above a cathode is shown in Fig. 6. Fig. 7 shows the mechanism of oxygen transport in soil to the corroding metal surface. Fig. 8 is a schematic drawing of the distribution of relative density of diffusional flow in dependence upon distance from the edge of the cathode. Fig. 9 gives three typical cases of the control of the corrosional process for different conditions of soil corrosion (that caused by micro-cells in most soils where cathode control predominates, by micro-cells in very friable dry soils, and

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### Theory of Subterranean Corrosion of Metals

corrosion caused by extended macro-cells (cathode-ohmic control). Fig. 10 shows distribution of flow density and potential in a model pipeline passing through the boundary of clay and sand with 10% moisture content. Fig. 11 presents a model for the investigation of corrosional cells of local dissimilar soils; Fig. 12, the outer view of a specimen with the distribution of the corrosional pittings upon its surface after a 4 months' test in sand of 10% moisture content. Table 1 gives numerical data on the anode and cathode polarizability and degree of anode and cathode control for corrosion of steel in various soils (very moist arenaceous-argillaceous soil, salinified moist sand, gray clay, etc.). Table 2 also gives data; these refer to the rapidity of corrosion of an anode sector of metal during the work of local micro-cell. Table 3 explains the effect of various conditions upon the basic factors and the rate of soil corrosion during the work of micro-cells.

There are 41 references, 31 of which are Slavic.

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Theory of Subterranean Corrosion of Metals

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Card 10/10

TOMASHOV, N.D.  
TOMASHOV, N.D.; TUGARINOV, N.I.

Mechanism of the corrosion of metals in molten chlorides. Zhur.  
prikl. khim. 30 no.11:1619-1625 N '57. (MIRA 11:2)  
(Chlorides) (Corrosion and anticorrosives)



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14(5)

PHASE I BOOK EXPLOITATION SOV/1882

Vsesoyuznoye soveshchaniye po korrozii i zashchite metallov.  
6th, Moscow, 1956

Teoriya i praktika protivokorroziionnoy zashchity podzemnykh sooruzheniy; trudy soveshchaniya (Theory and Application of Anti-corrosion Measures of Subterranean Installations; Transactions of the 6th All-Union Conference on Corrosion and Protection of Metals) Moscow, 1958. 273 p. Errata slip inserted. 3,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut fizicheskoy khimii. Komissiya po bor'be s korroziyey metallov.

Editorial Board: I.M. Yershov, Candidate of Technical Sciences; A.F. Lunev, Candidate of Chemical Sciences; Yu.N. Mikhaylovskiy, Candidate of Chemical Sciences, I.V. Strizhevskiy, Candidate of Technical Sciences; N.D. Tomashov, Professor, Doctor of Chemical Sciences; and P.V. Shchigolev, Candidate of Chemical

Card 1/7

Theory and Application of Anti-corrosion (Cont.) SOV/1882

Sciences; Resp. Ed.: N.D. Tomashov, Professor, Doctor of Chemical Sciences; Ed. of Publishing House: A.L. Bankvitser; Tech Ed.: P.S. Kashina.

PURPOSE: The book is intended for chemists, engineers, and metallurgists concerned with the problem of metal corrosion in underground installations.

COVERAGE: The book contains the papers read at the All-Union Conference of the Committee on the Control of Corrosion of the Academy of Sciences, USSR, held in May, 1956. The following scientific and technical problems discussed at the conference received particular attention: 1) theory of metal corrosion underground (N.D. Tomashov and S.I. Kuznetsov); 2) theory, calculation, and practical application of cathodic and anodic protection of underground installations (A.F. Lunev, I.M. Yershov, V.G. Kotik, V.V. Krasnoyarskiy, and A.N. Tsekun); 3) study of the anticorrosive properties and the improved technology in manufacturing and applying protective coatings to subterranean metallic installations (L. Ya. Tsikerman, V.I. Zhukov, M.D. Dzhafarov, and V.S. Artamonov); 4) prevention of stray current corrosion (I.V. Strizhevskiy, D.K. Tomlyanovich, P.G. Doroshenko, and

Card 2/7

Theory and Application of Anti-corrosion (Cont.) SOV/1882

A.I. Gordyukhin; 5) development of methods for determining the corrosion activity of soils (Yu. N. Mikhaylovskiy, N.D. Tomashov, M.S. Trifel', and V.V. Krasnoyarskiy); 6) concrete examples of corrosion and protection of underground installations (S.G. Vedenkin and V.S. Artamonov, V.A. Pritula, and S.S. Popov). There are 161 references, 128 of which are Soviet, 30 English, and 3 German.

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Theory and Application of Anti-corrosion (Cont.) SOV/1882

Resolution of the All-Union Conference on the Theory and  
Practice of Protection of Underground Installations  
Against Corrosion

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Card 7/7

TOMASHOV, N.D.

TOMASHOV, N.D.

~~RADUSHKOVICH, E.V.~~

24(6) 13 PRILE I BOOK EXPLORATION 004/1408  
Sovetskaya po modern isledovaniye struktury vyzvolivayemykh i poristoykh tel.  
M., Leningrad, 1958.

Metody isledovaniya struktury vyzvolivayemykh i poristoykh tel; tretye vostochno  
evropeyskiye (Methods of Investigating the Structure of Highly Vaporous  
and Porous Bodies). Transactions of the Second Conference) Moscow, Izd-vo AN  
SSSR, 1958. 894 p. 2,000 copies printed.

Sponsoring Agencies: Akademiyu nauk SSSR. Institut fizicheskoy khimii and  
Institut khimii silikatov.

Imp. M.: Dubinin, M.M., Academician; Ed. of Publishing House: Moscow, L.L.;  
Tech. M.: Markovich, S.M.

PURPOSE: This book is intended for scientists, teachers and advanced students  
interested in the structural analysis of highly dispersive and porous bodies.

COVERAGE: This collection contains reports by members of various Soviet insti-  
tutions of higher education: Institute of Physical Chemistry, AS USSR;  
Institute of Chemistry, AS Georgian SSR; Far Eastern Branch, AS USSR;  
Georgian Scientific Research Institute for Petroleum; State Optical Insti-  
tute; Leningrad Technological Institute; Moscow and Leningrad State Univer-  
sities; Far Eastern Polytechnical Institute; "Agrophysical" Institute, and others.  
Introductory remarks were made by Professor S.A. Toropov, Director of the  
Institute of Silicate Chemistry. Apart from reports under the four subject  
divisions (see Table of Contents), the collection includes discussions, con-  
siderations and proposals adopted at the close of the conference.

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Card 3/9

~~TOMASCHOW~~

TOMASCHOW N.D

GDR/Physical Chemistry - Electrochemistry

B-12

Abs Jour: Referat Zhur - Khim, No. 9, 1959, 30652

Author : Tomaschow, N.D.

Inst : Not given

Title : Passivity and Corrosion Resistance of Stainless Steels.

Orig Pub: Z Elektrochem, 717-729, 1958, No 6-7

Abstract: The author discusses experimental data on the corrosion and passivity (P) of stainless steels in acid solutions under different conditions (overpassivation, anodic and cathodic protection, negative differential effect). P is correlated with the inhibition of the anodic process. The author suggests that the quantitative evaluation of the degree of P be carried

Card 1/2

41

AUTHORS: Tomashov, N.D., Chernova, G.P., Al'tovskiy, R.M., 32-3-17/52  
Blinchevskiy, G.K.

TITLE: Development of a Method of Metal Dressing by a Solution for the Purpose of Studying the Effects of Passivity  
(Razvitiye metoda zachistki poverkhnosti metallov pod rastvorom dlya issledovaniya yavleniy passivnosti)

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol. 24, Nr 3, pp. 299-303 (USSR)

ABSTRACT: The method mentioned in the title was developed by G.B.Klark and G.V.Akimov [Ref.1]. The system was improved in that metal-dressing is carried out on the entire part of the surface that is in contact with the electrolyte; the emery stone has an automatically controlled and constant velocity; the test vessel is thermally controlled, and experiments can be carried out in an atmosphere of different gases. A schematical drawing with an exact description is given. The influence of the composition of stainless steel on the velocity of the formation of the protective coating as well as that exercised by the composition of the solution upon the latter in tungsten, zirconium, and titanium was investigated. As

Card 1/2

Development of a Method of Metal Dressing by a Solution  
for the Purpose of Studying the Effects of Passivity

32-3-17/52

may be seen from the results of investigation and from the diagrams given, the influence exercised by the composition of steel is of decisive importance. Among other things it was found that an increase of the concentration of chlorine ions in the solution renders re-establishment of the passivation of zirconium and titanium more difficult, whereas that of tungsten is rendered somewhat more easy. The re-passivation of titanium in a  $3n \text{ HCl} + 0.2n \text{ NaJ}$  solution is independent of the influence exercised by the oxygen in the air, as it promotes the formation of the  $J_2^-$ -complex ions. The method described makes it possible to carry out other investigations of this kind as e.g. that of the influence exercised by protective coatings upon the polarization properties of metals. There are 4 figures, and 2 references, 2 of which are Slavic.

ASSOCIATION: Institute of Physical Chemistry AS USSR (Institut fizicheskoy khimii Akademii nauk SSSR)

AVAILABLE: Library of Congress

Card 2/2 1. Metals-Passivity-Effects 2. Metals-Coating-Methods

AUTHORS: Tomashov, N.D., Lokotilov, A.A.

32-24-4-18/67

TITLE: The Determination of the Layer Thickness of the Moisture Coating on Metals in the Case of Atmospheric Corrosion (Opredeleniye tolshchiny plenki vlagi na metallakh pri atmosfernoy korrozii)

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol. 24, Nr 4, pp. 425-427 (USSR)

ABSTRACT: A method is suggested which makes it possible to enlarge the surface of investigated samples in such a manner that from the metal to be investigated spinel-like tubes are produced. These samples are put into a vessel which must be connected to an adsorption device. The latter in principle consists of a system by means of which a certain moisture content is imparted to the air and is made to flow with a velocity of 0.5 l/minute through the vessel with the sample investigated for 3 hours. Samples of copper, iron and zinc at room temperature and more than 55% air moisture were investigated. After the cycle of moisture deposit the vessel with the metal sample, which is now moistened, is placed into an electric furnace, where it is heated to 350°C for one hour, in

Card 1/2

The Determination of the Layer Thickness of the  
Moisture Coating on Metals in the Case of  
Atmospheric Corrosion

32-24-4-18/67

which case now a dried current of air passes over the sample, adsorbs the absorbed water in phosphorus pentoxide, after which it is weighed. Before the investigation a blind test is carried out. The error limit is given as being 3-7%. According to the investigations carried out the method described is found to permit a proof of a direct connection between the moisture adsorption process and the corrosion process. There are 3 figures, and 11 references, 4 of which are Soviet.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR i Moskovskiy institut stali (Institute for Physical Chemistry AS USSR and the Moscow Institute for Steel)

1. Metals---Corrosion
2. Atmosphere---Corrosive effects
3. Metals---Moisture factors
4. Moist air---Metallurgical effects
5. Metals---Test methods

Card 2/2

76-32-4-27/43

AUTHORS: Tomashov, N. D., Kurteпов, M. M., Mirolyubov, Ye. N.

TITLE: The Corrosion of Stainless and Carbon Steels During Cathodic Polarization in Nitric Acid Solutions (Korroziya nerzha-veyushchey i uglerodistoy staley pri katodnoy polyarizatsii v rastvorakh azotnoy kisloty)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol. 32, Nr 4, pp. 904 - 908 (USSR)

ABSTRACT: Investigations of stainless steel 18-8 (with niobium- 1X18H11<sup>5</sup>) in nitric acid solutions of from 3 - 40% HNO<sub>3</sub>, as well as of carbon steel of a similar carbon content and with additions of Mn, Si, S, P in 3% nitric acid were carried out. From the experimental results follows that the displacement of the steel potential to negative values with both kinds of steel leads to an increase of corrosion velocity with a maximal value being passed and a gas separation occurring only within certain intervals. The further experimental results in which were observed the presence of analogous functions of the corrosion

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76-32-4-27/43

The Corrosion of Stainless and Carbon Steels During Cathodic Polarization  
in Nitric Acid Solutions

velocity on the potential, of the acid concentration and the temperature, as well as of a resistance to corrosion according to time, point at a principal analogy of their mechanisms of corrosion in nitric acid solutions. The phenomenon of the above mentioned maximal value is explained by the fact that the protective layer forming on iron is reduced from iron oxide by cathodic polarization, and that it converts into a soluble modification, enters completely solution at the maximum, and that then a cathode protection of the steel occurs and the values decrease again. Similar observations were made by Bonhoeffer et al (Reference 11,12). The corrosion properties distinguishing the two types of steel are to be found in the corrosion velocity in active state as well as in the gas formation, which is explained by the reduction type of the protective layer, so that it is the decisive factor. There are 4 figures and 12 references, 8 of which are Soviet.

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76-32-4-27/43

The Corrosion of Stainless and Carbon Steels During Cathodic Polarization  
in Nitric Acid Solutions

ASSOCIATION: Akademiya nauk SSSR, Institut fizicheskoy khimii, Moskva  
(Moscow Institute for Physical Chemistry, AS USSR)

SUBMITTED: January 8, 1957

AVAILABLE: Library of Congress

1. Stainless steel--Corrosion
2. Carbon steel--Corrosion
3. Nitric acid--Corrosive effects

Card 3/3

SOV/137-58-12-24860

Translation from: Referativnyy zhurnal. Metallurgiya, 1958, Nr 12, p 123 (USSR)

AUTHORS: Vedeneyeva, M. A., Tomashov, N. D.

TITLE: Changes in the Internal Friction and the Frequency of the Natural Oscillations of Specimens of Kh18N9 Steel During Intercrystalline Corrosion (Izmeneniye vnutrennego treniya i chastoty sobstvennykh kolebaniy obraztsov stali tipa Kh18N9 pri mezhkristallitnoy korrozii)

PERIODICAL: Sb. Mosk. in-t stali, 1958, Vol 38, pp 483-494

ABSTRACT: The authors investigated the possibility of determining intercrystalline corrosion (IC) (in 0Kh18N9, 1Kh18N9, 1Kh18N9T, 2Kh18N9 and Kh23N23M3D3 steel) by measuring the internal friction (IF) by the method of plotting the resonance curve during excitation of transverse oscillations in the specimens and by the method of observing the damping of the amplitude of free torsional vibrations; also, by measuring the electric resistance of the specimens and  $\eta_0$ . IC was produced by immersing the specimens in a boiling solution of 110 g  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  and 55 cc  $\text{H}_2\text{SO}_4$  (sp. gr. 1.84) in one liter of water. The authors show that with the progress of IC the IF of the specimens increases, the resonance frequency of the oscillations decreases, and the modulus of

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SOV/137-58-12-24860

Changes in the Internal Friction and the Frequency of the Natural Oscillations (cont.)

elasticity calculated from the resonance frequencies also decreases. The changes in the resonance frequency, electric resistance, and strength are closely related. IF is a more sensitive indicator of IC and reduces corrosion-testing time. It also helps to discover minor intercrystalline decomposition. By testing the corrosion resistance of specimens of stainless steel in a sulfuric-acid solution of  $\text{CuSO}_4$  and in nitric solution the authors demonstrate that the increase in IF is the result of the IC process, whereas both the change in the resonance frequency of oscillations and the electric resistance are the result of an overall effect of the general and the IC. The authors remark that for discovering IC by the IF method the most convenient technique is the forced-oscillation method which affords the use of smaller specimens and the testing of both flat and wire specimens. The authors establish the different processes of the intercrystalline decomposition of steel in acid  $\text{CuSO}_4$  and  $\text{H}_2\text{SO}_4$  solutions and in solutions containing  $\text{HNO}_3$  (boiling 55%  $\text{HNO}_3$  and 20%  $\text{HNO}_3$  + 1%  $\text{NaF}$ ).

P. S.

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SOV/137-58-11-23072

Translation from: Referativnyy zhurnal. Metallurgiya, 1958, Nr 11, p 177 (USSR)

AUTHORS: Tomashov, N. D. , Vedeneyeva, M. A. , Gedgovd, K. N.

TITLE: Effect of Tensile Static and Alternating Stresses on the Corrosion of 1Kh18N9 Steel (Vliyaniye rastyagivayushchikh staticheskikh i znakoperemennykh napryazheniy na korroziyu stali 1Kh18N9)

PERIODICAL: Sb. Mosk. in-t stali, 1958, Vol 38, pp 574-583

ABSTRACT: Results of an investigation of the effect of the state of stress of 1Kh18N9 steel on its stability in a solution which causes inter-crystalline corrosion while it is simultaneously subjected to tensile static and alternating loads.

N. L.

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SOV/137-58-11-23048

Translation from: Referativnyy zhurnal. Metallurgiya, 1958, Nr 11, p 174 (USSR)

AUTHORS: Tomashov, N. D. , Zhuk, N. P. , Kernich, N. K.

TITLE: Corrosion Pitting of Stainless Steel (Tochechnaya korroziya nerzhaveyushchey stali)

PERIODICAL: Sb. Mosk. in-t stali, 1958, Vol 38, pp 584-602

ABSTRACT: The tendency of 1Kh18N9T steel towards pitting (P) and the effect of various factors on this type of corrosion were investigated by the method of determination of the piercing potential. It is shown that among the  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{F}^-$ ,  $\text{I}^-$  and  $\text{SO}_4^{2-}$  anions the greatest amount of P is caused by  $\text{Cl}^-$  and the least by  $\text{I}^-$ . By means of experiments with aqueous solutions of NaCl of various concentrations (from 0.001 to 5N) it was found that the relationship between the piercing potential of 1Kh18N9T steel and the activity of  $\text{Cl}^-$  in the solution has a logarithmic character. The character of  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ , and  $\text{Ba}^{2+}$  cations has little effect on the tendency of steel towards P. The effect of the pH value of the medium (0.5N solution of NaCl with additions of HCl or NaOH) varies. The effect of the temperature was investigated in the 3-90°C range. The resistance of

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SOV/137-58-11-23048

### Corrosion Pitting of Stainless Steel

1Kh18N9T steel to P decreases with the rise in temperature in connection with the increasing rate of the action of  $\text{Cl}^-$  on the protective oxide film and the decreasing contents of the passivator ( $\text{O}_2$ ) in the solution. The determination of the piercing potential of Cr-Ni steel of six industrial grades showed that Kh18N12M2T steel (2.8% Mo) possesses the greatest resistance to P. Introduction of Nb (Kh18N9M2B steel) lowers its resistance appreciably. An increase in the amount of Ti and C in steel produces similar results. The introduction of Mn into Cr-Ni steel with a simultaneous decrease of its Ni contents reduces greatly the resistance of the steel to P. An increase in Cr content (from 0.2 to 41.5%) increases P resistance. The results of 15 days' comparative corrosion tests by full or intermittent immersion of Cr and Cr-Ni steels in solutions of 0.5N  $\text{FeCl}_3$  and 0.49N  $\text{NaCl} + 0.01\text{N HCl}$  agree fully with the data obtained by the method of determination of piercing potential. Bibliography: 17 references.

P. S.

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5(4)

AUTHORS: Tomashov, N. D., Al'tovskiy, R. M.,  
Arakelov, A. G.

SOV/20-121-5-33/50

TITLE: The Anodic Protection of Titanium in Sulfuric Acid (Anodnaya  
zashchita titana v sernoy kislote)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 121, Nr 5,  
pp 885 - 888 (USSR)

ABSTRACT: This paper investigates the processes of the formation  
of oxide films by self-passivation of titanium in  
solutions of sulfuric acid and the processes on the metal  
surface which are caused by anodic polarization. The  
investigations were carried out for titanium of the type  
**VT-1D** (O: 0,23 - 0,26%, H: 0,022 - 0,023%, N: 0,017%,  
Fe: 0,12%, Si: 0,05%) in solutions of sulfuric acid at  
room temperature. A diagram shows the behavior of  
titanium during the dressing (zachistka) of the surface  
in solutions of sulfuric acid. Titanium restores the  
passive state after the dressing of the surface in a  
5% solution of  $H_2SO_4$ . In 10%  $H_2SO_4$ , titanium remains

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The Anodic Protection of Titanium in Sulfuric Acid

SOV/29-121-5-33/50

in the active state after dressing. The potential of the active state of titanium in sulfuric acid was equal to  $\sim 0,3$  V. The oxygen in the air dissolved in the electrolyte, plays the principal rôle in the conservation of the stability of the passive state of titanium in diluted solutions of sulfuric acid. If the titanium surface is treated in a 10% solution of  $H_2SO_4$  in an oxygen atmosphere, the titanium also turns into the passive state. There is a protecting, stable oxide film on the surface of titanium in the passive state. Also the surface of titanium in its active state is partially covered by an oxide film. The second diagram shows the curves of the anodic polarization of titanium in solutions of sulphuric acid of various concentrations. The anodic polarizability in the region of the active dissolution of titanium increases if the concentration of the sulfuric acid decreases. The last diagram shows the results of the corrosion experiments on titanium samples with and without anodic protection. The corrosion losses of the non-protected samples increased

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The Anodic Protection of Titanium in Sulfuric Acid

SOV/20-121-5-33/50

linearly with time. After an anodic protection of titanium in both of the investigated solutions of sulfuric acid practically no corrosion losses were found. There are 4 figures and 12 references, 9 of which are Soviet.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry, AS USSR)

PRESENTED: April 11, 1958, by P.A.Rebinder, Academician

SUBMITTED: April 8, 1958

Card 3/3

PHASE I BOOK EXPLOTTATION

SOV/4271

Akademiya nauk SSSR. Institut fizicheskoy khimii

Issledovaniya po korrozii metallov. [vyp.] 5: Novyye metody i pribory dlya korroziionnykh ispytaniy (Investigations on Corrosion of Metals [ No. 5]: New Methods and Instruments for Corrosion Testing) Moscow, Izd-vo AN SSSR, 1959. 176 p. (Series: Its: Trudy, vyp. 7) Errata slip inserted. 3,000 copies printed.

Resp. Ed.: N. D. Tomashov, Doctor of Chemistry, Professor; Ed. of Publishing House: N. G. Yegorov; Tech. Eds: G. A. Astaf'yeva and Ye. V. Zelenkova; Editorial Board: N. D. Tomashov, A. V. Byalobzheskiy, Candidate of Chemistry, and P. V. Shchigolev, Candidate of Chemistry.

PURPOSE: This collection of articles is intended for scientific workers at research institutes and technical personnel of plant laboratories.

COVERAGE: The articles included in this collection deal basically with methods of corrosion investigation which have not yet been published in Soviet periodical

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Investigations on Corrosion (Cont.)

SOV/4271

literature but are of definite interest for studying corrosion processes. A wide range of problems is covered. In addition to the methods discussed the articles provide some experimental data which make possible full utilization of each individual method. No personalities are mentioned. References accompany each article.

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18(7); 25(1)

PHASE I BOOK EXPLOITATION

SOV/3133

Korroziya i zashchita staley; sbornik statey (Corrosion and Protection of Steel: Collection of Articles) Moscow, Mashgiz, 1959. 233 p. 7,000 copies printed.

Ed.: N.D. Tomashov, Doctor of Chemical Sciences, Professor; Reviewers: A.A. Zhukhovitskiy, Doctor of Chemical Sciences, Professor, and K.S. Ponomareva, Docent; Ed. of Publishing House: Ya.G. Alaverdov; Tech. Ed.: S.M. Popova; Managing Ed. for Literature on Machine and Instrument Construction: N.V. Pokrovskiy, Engineer.

PURPOSE: This book is intended for scientific and technical personnel concerned with questions of the corrosion and protection of metals.

COVERAGE: The articles in this collection deal with the corrosion of steels in corrosive environments, investigation of the effect of various factors on corrosion, and methods of protecting steels from gas and electrochemical corrosion. Special attention is given to new methods of investigation. A number of the articles give the results of studies made under operating conditions. New data, obtained by the Department of Metal Corrosion,

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Corrosion and Protection of Steel (Cont.)

SOV/3133

Moskovskiy institut stali (Moscow Institute of Steel), are published here for for the first time. Four articles are the result of work conducted jointly at the laboratories of the Moskovskiy metallurgicheskiy zavod "Serp i molot" (Moscow Metallurgical Plant "Serp i molot") and the Khimicheskiy zavod imeni M.I. Kalinina (Chemical Plant imeni M.I. Kalinin). Most of the articles contain practical recommendations on the protection of metals from corrosion. No personalities are mentioned. References follow each article .

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